



Bayesian Hierarchical Model Assessment of Community Health Centre Reliability in Rwanda,

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Abstract

Community health centers in Rwanda have been pivotal in addressing healthcare needs across diverse geographic and socioeconomic settings. Despite their importance, there is a need for methodological evaluation to assess the reliability of these systems. A Bayesian hierarchical model was employed to analyse data from multiple community health centers. This approach allowed for the estimation of uncertainty and variability across different sites while accounting for site-specific factors. The analysis revealed significant heterogeneity in service delivery quality among the health centers, with some facilities achieving higher reliability scores than others. The findings suggest that targeted interventions focusing on areas of low reliability could enhance overall system performance and improve patient outcomes. Future research should focus on implementing evidence-based guidelines and training programmes to address identified weaknesses in the less reliable centers. Treatment effect was estimated with $\text{logit}(\pi) = \beta_0 + \beta^T X_i$, and uncertainty reported using confidence-interval based inference.

Keywords: *Rwanda, Bayesian hierarchical model, reliability assessment, intervention study, medical systems, geographic information systems, methodology*

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